ELEMENTS OF INTEGRATED PHYSICS & CHEMISTRY

Standard 10 SC.912.P.10: Energy	Student Text	Practice Book	Teacher Resource Edition Activities & Projects
SC.912.P.10.1 Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.	126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181	126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181	Ch25, Ch26, Ch27, Ch28, Ch29, Ch30, Ch31, Ch32, Ch33, Ch34, Ch35
SC.912.P.10.2 Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.	89	89	
SC.912.P.10.3 Compare and contrast work and power qualitatively and quantitatively.			
SC.912.P.10.4 Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.	139, 144, 168, 170, 171	139, 144, 168, 170, 171	Ch27, Ch33
SC.912.P.10.5			

Relate temperature to the average molecular kinetic energy.	126	126	Ch25
SC.912.P.10.6 Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.	126	126	Ch25
SC.912.P.10.7 Distinguish between endothermic and exothermic chemical processes.			
SC.912.P.10.8 Explain entropy's role in determining the efficiency of processes that convert energy to work.			
SC.912.P.10.9 Describe the quantization of energy at the atomic level.	140	140	Ch27
SC.912.P.10.10 Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).	113, 115, 116, 117, 119, 136, 137, 138, 139, 140, 167, 168, 169, 170, 171	113, 115, 116, 117, 119, 136, 137, 138, 139, 140, 167, 168, 169, 170, 171	Ch23, Ch27, Ch33
SC.912.P.10.11 Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.	167, 168, 169, 170, 171	167, 168, 169, 170, 171	Ch33
SC.912.P.10.12 Differentiate between chemical and nuclear reactions.			

SC.912.P.10.13 Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.	157, 158, 159, 160, 161, 165, 166	157, 158, 159, 160, 161, 165, 166	Ch31
SC.912.P.10.14 Differentiate among conductors, semiconductors, and insulators.	43, 44, 157, 158, 166		
SC.912.P.10.15 Investigate and explain the relationships among current, voltage, resistance, and power.	157, 158, 159, 160, 161	157, 158, 159, 160, 161	Ch31
SC.912.P.10.16 Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.	162, 163, 164, 165, 166	162, 163, 164, 165, 166	Ch32
SC.912.P.10.17 Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.	136, 137, 138, 139, 140	136, 137, 138, 139, 140	Ch27
SC.912.P.10.18 Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.	136, 137, 138, 139, 140	136, 137, 138, 139, 140	Ch27
SC.912.P.10.19			

Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.			
SC.912.P.10.20 Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.	126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140	126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140	Ch25, Ch26, Ch27
SC.912.P.10.21 Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.	131, 132, 133, 134, 135	131, 132, 133, 134, 135	Ch25, Ch26, Ch27
SC.912.P.10.22 Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.	141, 142, 143, 144, 145, 146, 147, 148, 149, 150	141, 142, 143, 144, 145, 146, 147, 148, 149, 150	Ch28, Ch29
Standard 10 SC.912.P.12: Motion	**Student Text**	**Practice Book**	**Teacher Resource Edition Activities & Projects**
SC.912.P.12.1 Distinguish between scalar and vector quantities and assess which should be used to describe an event.			
SC.912.P.12.2 Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.	94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104	94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104	
SC.912.P.12.3			

Interpret and apply Newton's three laws of motion.	89, 113	89, 113
SC.912.P.12.4 Describe how the gravitational force between two objects depends on their masses and the distance between them.	89	89
SC.912.P.12.5 Apply the law of conservation of linear momentum to interactions, such as collisions between objects.	89	89
SC.912.P.12.6 Qualitatively apply the concept of angular momentum.	89	89
SC.912.P.12.7 Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.	122	122
SC.912.P.12.8 Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.	16	16
SC.912.P.12.9 Recognize that time, length, and energy depend on the frame of reference.	96	96
SC.912.P.12.10 Interpret the behavior of ideal gases in terms of kinetic molecular theory.		

SC.912.P.12.11 Describe phase transitions in terms of kinetic molecular theory.			
SC.912.P.12.12 Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.	84, 86	84, 86	
SC.912.P.12.13 Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.			
Standard 6 SC.912.E.6: Earth Structures	**Student Text**	**Practice Book**	**Teacher Resource Edition Activities & Projects**
SC.912.E.6.1 Describe and differentiate the layers of Earth and the interactions among them.	107	107	Ch21
SC.912.E.6.2 Connect surface features to surface processes that are responsible for their formation.	105, 106	105, 106	Ch21
SC.912.E.6.3 Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.	107	107	Ch21
SC.912.E.6.4 Analyze how specific geologic processes and features are expressed in Florida and elsewhere.			
SC.912.E.6.5			

Describe the geologic development of the present day oceans and identify commonly found features.	105, 106, 107, 108	105, 106, 107, 108	Ch21
SC.912.E.6.6 Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.	177, 178, 179, 180, 181, 182, 183, 184, 185, 186	177, 178, 179, 180, 181, 182, 183, 184, 185, 186	Ch35, Ch36
Standard 7 SC.912.E.7: Earth Systems and Patterns	**Student Text**	**Practice Book**	**Teacher Resource Edition Activities & Projects**
SC.912.E.7.1 Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.	66	66	
SC.912.E.7.2 Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.	66	66	Ch13
SC.912.E.7.3 Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.	66	66	Ch20
SC.912.E.7.4 Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.			Ch20
SC.912.E.7.5			

Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.			Ch20
SC.912.E.7.6 Relate the formation of severe weather to the various physical factors.	104, 130	104, 130	Ch20
SC.912.E.7.7 Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.	182	182	
SC.912.E.7.8 Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.			
SC.912.E.7.9 Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.			
Standard 1 SC.912.N.1: The Practice of Science	**Student Text**	**Practice Book**	**Teacher Resource Edition** **Activities & Projects**
SC.912.N.1.1			

Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: Pose questions about the natural world, (Articulate the purpose of the investigation and identify the relevant scientific concepts). Conduct systematic observations, (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines). Examine books and other sources of information to see what is already known, Review what is known in light of empirical evidence, (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models). Plan investigations, (Design and evaluate a scientific investigation). Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage). Pose answers, explanations, or descriptions of events, Generate explanations that explicate or describe natural phenomena (inferences), Use appropriate evidence and reasoning to justify these explanations to others, Communicate results of scientific investigations, and Evaluate the merits of the explanations produced by others.	11	11	Ch15
SC.912.N.1.2 Describe and explain what characterizes science and its methods.	11	11	Ch1, Ch15
SC.912.N.1.3 Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.	11	11	Ch15
SC.912.N.1.4			

Identify sources of information and assess their reliability according to the strict standards of scientific investigation.	11	11	Ch15
SC.912.N.1.5 Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.	11	11	Ch15
SC.912.N.1.6 Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	11	11	Ch15
SC.912.N.1.7 Recognize the role of creativity in constructing scientific questions, methods and explanations.	11	11	Ch15

Standard 2 SC.912.N.2: The Characteristics of Scientific Knowledge	**Student Text**	**Practice Book**	**Teacher Resource Edition Activities & Projects**
SC.912.N.2.1 Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	Ch1
SC.912.N.2.2 Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	Ch1

SC.912.N.2.3 Identify examples of pseudoscience (such as astrology, phrenology) in society.			
SC.912.N.2.4 Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.	11	11	
SC.912.N.2.5 Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.			Ch1
Standard 4 SC.912.N.4: Science and Society	**Student Text**	**Practice Book**	**Teacher Resource Edition** **Activities & Projects**
SC.912.N.4.1 Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.			
SC.912.N.4.2			

Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.	176, 177, 182, 183, 184, 185, 186	176, 177, 182, 183, 184, 185, 186	
Standard 8 SC.912.P.8: Matter	**Student Text**	**Practice Book**	**Teacher Resource Edition Activities & Projects**
SC.912.P.8.1 Differentiate among the four states of matter.	12, 13, 14, 15, 16	12, 13, 14, 15, 16	Ch2, Ch3
SC.912.P.8.2 Differentiate between physical and chemical properties and physical and chemical changes of matter.	2, 3, 4, 5, 6, 7, 8, 9, 10	2, 3, 4, 5, 6, 7, 8, 9, 10	Ch2, Ch3
SC.912.P.8.3 Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.			Ch1
SC.912.P.8.4 Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.	11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 34, 45, 47, 57, 67, 68, 79, 80, 157, 158, 167	11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 34, 45, 47, 57, 67, 68, 79, 80, 157, 158, 167	Ch5, Ch6, Ch7
SC.912.P.8.5			

Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.	25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 44, 48, 49, 50, 51, 54, 80, 81, 82	25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 44, 48, 49, 50, 51, 54, 80, 81, 82	Ch5, Ch6, Ch7
SC.912.P.8.6 Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.	49, 67	49, 67	Ch16
SC.912.P.8.7 Interpret formula representations of molecules and compounds in terms of composition and structure.	67, 79, 80, 81, 82, 83	67, 79, 80, 81, 82, 83	Ch16
SC.912.P.8.8 Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.	24, 84, 85, 86, 87, 88	24, 84, 85, 86, 87, 88	Ch16
SC.912.P.8.9 Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.			
SC.912.P.8.10 Describe oxidation-reduction reactions in living and non-living systems.	81, 82, 83	81, 82, 83	Ch16
SC.912.P.8.11 Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.	87, 88	87, 88	Ch7
SC.912.P.8.12			

Describe the properties of the carbon atom that make the diversity of carbon compounds possible.	18, 25, 27, 48, 49, 53, 54, 79	18, 25, 27, 48, 49, 53, 54, 79	
SC.912.P.8.13 Identify selected functional groups and relate how they contribute to properties of carbon compounds.	49, 53, 54, 70, 73, 79, 84, 86, 173, 174	49, 53, 54, 70, 73, 79, 84, 86, 173, 174	Ch10, Ch11, Ch13, Ch16